These are usually followed by more mesophytic mosses which in time may be entirely crowded out in the competition with herbaceous plants. In the dune region at the head of Lake Michigan we find near the shore what is known as the cottonwood dune, because the cottonwood, *Populus deltoides* Marsh., is the first tree to make a successful growth upon the nearly bare sand. As the dune grows older, or as we go further from the lake among the older dunes, we find that the cottonwood has given place to the Jack pine, *Pinus Banksiana* Lamb. The pine dune is later replaced by an association of red, white, and black oak, the last oak succession being in some places a pure stand of *Quercus alba* L. As with the higher plants, so in like manner with the mosses, we may trace a succession in these tree habitats.

In the rock series the first plants are lichens, or, in very moist places, liverworts, which are then succeeded by pioneer mosses and these in turn by other mosses or herbaceous plants. In the water series, floating mosses may occur in open water, and along the margin, partly submerged, are the same or related species. As the surface mat is formed in the deeper lakes various types of hydrophytic mosses are abundant in the fen (sedges—bulrush—cat-tail) association. In the shrub and early tree associations new mosses take the place of the pioneers as in the other cases.

One of the most noticeable facts brought out by the entire study is the great reduction in number of species in the late oak and climax forests, which appears in marked contrast to the conditions found in many regions.[1] The forest floor in all the forests under consideration is nearly free from fallen logs; hence, any mosses must compete with herbaceous plants for possession of the ground. In the ravines, logs and stumps are more common, and here we find a somewhat greater abundance of mosses.

CORVALLIS, OREGON.

APLOZIA PENDLETONII PEARSON

WM. HY. PEARSON

Since I wrote my description of the above species[2], I have received from Mr. Pendleton several packets of the same species, with a note: "In fruit when collected." I have not been able to find any trace of fruit, which probably disappeared in the process of drying, but there are numerous perianths. What I described in my note as immature, are evidently normal-sized and perfect perianths. Their smallness, only about half the size of the bracts (perianth .75 mm. x .5 mm., bracts 1.25 mm. x .5 mm.) by which they are entirely hidden, affords another good character for this remarkable species. The folds are more

[1] COOPER, WM. S. The Ecological Succession of Mooses on Isle Royale, Lake Superior. Plant World **15**: 197–213. 1912.

[2] Pearson, Wm. Hy. *Aplozia Perdletonii*, n. sp. BRYOLOGIST **23**: 50 52. (Pl. II, including 8 figs.) 1920.

usually 4 than 5; a cross-section taken at the middle shows a row of about 100 single cells, the lower portion being 2 cells thick. The mouth is very small, constricted and entire.

Probably Mr. Pendleton will distribute specimens amongst his American friends, but I shall be glad to send specimens to any student interested in the species.

APLOZIA PENDLETONII Pearson

Fig. 1. Bracts, with perianth, × 24.
Fig. 2. Cross-section of perianth, about the middle, × 24.
Fig. 3. Mouth of perianth, explanate, × 50.

PORELLA RIVULARIS (NEES) LINDB.

WM. HY. PEARSON

Madotheca rivularis Nees, Nat. Eur. Leb. **3:** 196 (1838).
Porella rivularis (Nees) Lindb. Musc. Scand. 3. (1879).

Mr. James Murray of Carlisle, England, has recently sent me a *Porella* from Portland, Oregon, which I have little hesitation in referring to the above species: it is a very fine form, stems 2 to 3 inches long, distantly bipinnate; the quadrate-oval, very decurrent underleaves scarcely wider than the stem, dentate at their base, bracteole minutely denticulate; perianths numerous, produced from the chief stem or branches, very large, with an extremely small mouth which is irregularly jagged with a few one-celled teeth. The irregular mouth of the perianth gives one the impression that it has been weathered, but young perianths show the same character.

The articles by Dr. Evans (Rhodora. **18**: 79–85, 103–120. 1916) have been particularly helpful to me in my studies of the American *Porellae*, of which we have a very fine collection in the Manchester Museum. Owing to the War, I have not seen Mueller's reasons (Rabenhorst: Krypt. Flora 6^2: 585. 1915.) for adopting the old name of *Cordeana* Hueben. for this species; seeing that Nees (G. N. L. Syn. Hep. 282) quotes *Cordeana* Hueben, as a synonym for *Porella*